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(54) Mounting tool for hydromechanical chuck

(57) A mounting tool for a hydromechanical chuck or mandrel of the type which is clamp connected using a pressure medium in order to clamp connecting a shaft or a shaft tool or a working piece, and in which said shaft or working piece is dismantled from the chuck, and which chuck using a pressure medium in the opposite direction, and which chuck is formed with two separate pressure chambers, a first chamber acting as a clamp connection chamber, and a second chamber acting as a dismantling chamber, which chambers are formed with inlets/outlets provided on opposite sides of the chuck and opening at the periphery thereof. The mounting tool is formed as a yoke (2) adapted to stridingly engage the chuck or mandrel to be actuated, said yoke having a first leg (4) formed with a fixed nozzle (8) and the second leg (5) formed with an axially displaceable nozzle (9), both nozzles adapted to engage the two opposite inlets/outlets of the chuck to be activated, and each leg (4, 5) formed with a passageway (6, 7) for directing pressure medium into and out of the nozzle (8, 9). The yoke (2) is substantially U-shaped having the legs thereof (4, 5) so widely spaced as to be able to engage differently wide chucks.

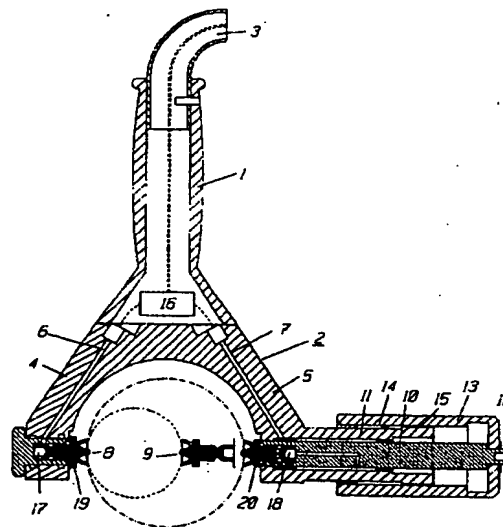


Fig. 1

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Description

Technical Field

[0001] The present invention generally relates to a mounting tool for a hydromechanical chuck or a hydromechanical mandrel of the type which is pressurised by means of a pressure medium for clamp connecting a shaft or a shaft tool or a working piece and which is dismantled for releasing said shaft or working piece from the chuck, and which for the purpose is formed with two separate pressure chambers, a pressurisation chamber for clamp connecting the tool or work piece and a dismantling chamber for releasing the tool or work piece from the chuck or mandrel, and which for this purpose is formed with inlets/outlets provided on opposite sides of the chuck and opening at the periphery surface thereof.

[0002] In figures 2 and 3 of the attached drawings there is shown, as one out of several examples, a hydromechanical cone coupling chuck formed by an inner sleeve having a conical outer surface and a central bore in which the shaft of a tool is adapted to be clamp connected, and an outer sleeve which is axially displaceable on the conical outer surface of said inner sleeve, and having two separate hydraulic actuation systems for displacement of the outer sleeve on the inner sleeve, a first system for displacement of the outer sleeve in clamp direction and a second system for displacement of the outer sleeve in a direction for releasing the tool.

[0003] It is, however, to be understood that the invention is useful for many other types of hydromechanical than the chuck illustrated in the attached drawings, for instance a hydromechanical mandrel.

Prior Art

[0004] Conical mechanical chucks or mandrels are known in the art, in which the clamping means are of purely mechanical type, like screws, nuts, threads etc. For pressurizing and dismantling, respectively, of a hydromechanical chuck or mandrel of the above mentioned type it has been suggested to use a separate, external pressurisation means which is connected to the inlet/outlet of the hydraulic pressurisation and dismantling chamber, respectively. There are problems involved in such activation of the clamp bushing or mandrel. For instance, upon pressurisation of the clamp connection chamber hydraulic oil is pressed out from the dismantling chamber, and upon introducing pressure fluid in the dismantling chamber an equivalent amount of fluid is pressed out from the clamp pressure chamber; the connection of the pressure source can be complicated and time consuming; there is generally a need for using thread, screw or nut connections for mounting of the pressure source means.

Object of the Invention

[0005] The object of the present invention is to provide a simple and useful mounting tool for use in connection to hydromechanical chucks or mandrels etc. of the above mentioned type, which tool

- is adjustable for use in connection to chucks or mandrels etc. having different diameters,
- which can be quickly and easily connected to the chuck etc.,
- which is connected both to the inlet/outlet of the clamp connection chamber and to the inlet/outlet of the dismantling chamber by a fluid system operating concurrently at both pressure chambers,
- which is connected to the chuck simply by forcing pressure pistons into contact with said inlets/outlets of the pressure chambers, and in which said pressure pistons are sealed more strongly against the chuck inlets/outlets as the inlet pressure is increased,
- which pressure pistons are spring biased, so that the evacuation piston becomes pressed back,
- which can likewise quickly and simply be released,
- in which the pressurisation and dismantling, respectively, can quickly and simply be reversed by means included in the mounting tool,
- which automatically receives pressure medium which is evacuated from any of the chambers, so that there is no waste and overflow of oil/fat from the chuck.

Short Description of the Drawings

[0006] Now the invention is to be described more in detail with reference to the accompanying drawings, in which figure 1 shows a cross section view of a mounting tool according to the invention, figure 2 shows another cross section view of the tool while used in connection to a type of hydromechanical chuck, and figure 3 is a perspective cross section view of the mounting tool according to the invention used in combination with a hydromechanical chuck.

Detailed Description of the Invention

[0007] The mounting tool shown in the drawing generally comprises a handle 1 which at one end is formed with a generally U-shaped yoke 2, or a ring, adapted to be moved stridingly over the chuck (or mandrel etc.) to be pressurised or dismantled, and which at the opposite end is formed with means 3 for supply of pressure medium to the each hydraulic clamp connection/dismantling chambers of the chuck. Each leg 4 and 5 of the yoke 2 is formed with passageways 6, 7 for supply of pressure medium to a pressure nozzle 8, 9 with a splash protection cup at the end of each leg. The flow of fluid is moved round the tool and is sealed at both opposite

sides of the clutch. The left nozzle 8, as seen in figure 1, is fixed mounted to the leg 4, the right nozzle 9 is mounted at the end of a nozzle carrier 10 which is axially displaceable in a sleeve 11 which is integral with the right yoke leg 5. At the outer end 12 of the nozzle carrier 10, which extends out of the sleeve 11 there is rotatably mounted a hollow nut 13 formed with inner threads 14 co-operating with outer threads 15 at the outer end of the sleeve 11. By turning the hollow nut 13 the shaft like nozzle carrier 10 is moved to the left or to the right on the sleeve 11, as shown diagrammatically in figure 1. By turning the nut 13 in the clamp connection direction the right nozzle is moved closer to the left nozzle 8 so as to engage the chuck. At the same time the left nozzle is moved into contact with the opposite side of the chuck. By turning the nut 13 in the opposite direction the nozzles are moved apart from the chuck.

[0008] As indicated with the dotted circles in figure 1 the mounting tool can be used for chucks of widely differing diameters only by turning the hollow nut 13, acting like a micrometer screw, in or out in the sleeve 11.

[0009] For distributing the pressure medium entering at the pressure inlet 3 there is a distribution box 16 which can be mounted in the handle 1 or the tool, and from which box 16 pressure oil or fat is pressed through the passageway 6 or 7, which passageways are in direct communication with pressure chambers 17, 18 and with the nozzles 8 and 9 and with axial bores 19 and 20 thereof. The distribution box 16 is formed with means for reversing the direction of distribution of pressure medium so as to supply pressure medium to the left nozzle 8 or the right nozzle 9, respectively, and concurrently therewith allowing escape of evacuated oil or fat from the opposite nozzle.

[0010] In figure 2 the mounting tool is shown during pressurisation of a chuck 21 adapted to clamp connecting a shaft 22, e.g. a shaft of a tool. Said chuck is only one, out of many different types of mounting means which can be handled by the mounting tool means of the invention. In the illustrated case the chuck is formed with an inner sleeve 23 which is integral with a mounting cone 24 for mounting of the chuck in a working machine (not shown), and with an outer sleeve 25 which is axially displaceable on the inner sleeve 23. Between said inner and outer sleeves there are formed two separate pressure chambers, a first chamber 26 for tightening the outer sleeve 25 on the inner sleeve 23 thereby clamp connecting the tool shaft 22 in the chuck, and a second pressure chamber 27 for forcing the outer sleeve 25 in the opposite direction thereby releasing the tool shaft 22. Each of the pressure chambers 26, 27 is connected to an inlet/outlet opening 28, 29, which openings are preferably provided opposite each other and opening at the periphery of the chuck.

[0011] The pressure pistons comprising the nozzles 8, 9 and the splash protection cups can be formed with different pressure areas depending on type and size of chuck to be pressurised. The nozzles 8, 9 preferably are

formed with blocking means arranged to stop and seal the flow of fluid out of the nozzle when said nozzle is out of contact with the chuck. Also, the splash protection cups of the nozzles can be formed with vacuum means adapted to vacuum seal said cups against the outer periphery of the chuck while the nozzles 8 and 9 are sealed against the bottom inlets/outlets 28, 29 of the chuck during pressurisation and dismantling. The splash protection cups mainly act to prevent splash of oil or fat from the nozzles 8, 9 and the inlets/outlets 28, 29 upon clamp connecting and dismantling, respectively, of the tool to/from the chuck (or mandrel).

[0012] When using mounting tool according to the invention the tool is moved with the fixed nozzle 8 into contact with one of the inlet/outlet openings 28, 29 of the chuck or mandrel, no importance which one, and the hollow nut 13 is turned in clamp connection direction so that the opposite nozzle 9 comes into contact with the other inlet/outlet opening. The nut 13 is turned enough as to secure a provide a tight seal between the chuck and the mounting tool. Pressure fluid is introduced by means of the pressure supply means 3, and the distribution box 16 is set so as to supply pressure fluid to the clamp connection chamber 26 or to the dismantling chamber 27, resp. After the shaft 22 has been clamp connected to the chuck the mounting tool is unscrewed from the chuck and the chuck is ready for use. The mounting tool now can be used for clamp connecting or for dismantling of other chuck appliances.

Reference numerals

[0013]

- | | | |
|----|----|-----------------------|
| 35 | 1 | handle |
| | 2 | yoke |
| | 3 | pressure supply means |
| | 4 | leg |
| | 5 | leg |
| 40 | 6 | passageway |
| | 7 | passageway |
| | 8 | nozzle |
| | 9 | nozzle |
| | 10 | nozzle carrier |
| 45 | 11 | sleeve |
| | 12 | outer end |
| | 13 | hollow nut |
| | 14 | inner threads |
| | 15 | outer threads |
| 50 | 16 | distribution box |
| | 17 | pressure chamber |
| | 18 | pressure chamber |
| | 19 | bore |
| | 20 | bore |
| 55 | 21 | chuck |
| | 22 | shaft |
| | 23 | inner sleeve |
| | 24 | mounting cone |

- 25 outer sleeve
- 26 connection pressure chamber
- 27 release pressure chamber
- 28 inlet/outlet (of 26)
- 29 inlet/outlet (of 27)

Claims

1. A mounting tool for a hydromechanical chuck or mandrel of the type which is clamp connected using a pressure medium for clamp connecting a shaft (22), a shaft tool or a working piece to the chuck or mandrel and in which said shaft (22) or working piece is dismantled from the chuck or mandrel using a pressure acting in the opposite direction (22), and which is formed with two separate pressure chambers (26, 27), a first chamber (26) for pressurization of a clamp connection means of the chuck and a second chamber (27) for pressurization of a dismantling means of the chuck, and which is formed with inlets/outlets (28, 29) provided on opposite sides of the chuck and opening at the periphery surface thereof, **characterised** in that the mounting tool is formed as a yoke (2) or a ring adapted to stridingly engage a chuck to be actuated, a first leg (4) formed with a first nozzle (8) and the second leg (5) formed with an axially displaceable second nozzle (9), which nozzles (8, 9) are movable in relation to each other, and both nozzles adapted to engage the opposite inlets/outlets (28, 29) of the chuck to be activated.
2. A mounting tool according to claim 1, **characterised** in that the yoke (2) is substantially U-shaped having the legs thereof (4, 5) spaced so as to be able to engage differently wide chucks.
3. A mounting tool according to claim 1 or 2, **characterised** in that the axially displaceable nozzle (9) is mounted at the end of a shaft like nozzle carrier (10) which is axially movable towards and away from the fixed nozzle (8) so as to adapt the mounting tool to chucks of different sizes.
4. A mounting tool according to claim 3, **characterised** in that the axially movable nozzle carrier (10) with the nozzle (9) is slideable in a sleeve (11) which is integral with the yoke (2) and extends out of said sleeve (11).
5. A mounting tool according to claim 4, **characterised** in that there are means for axially forcing the nozzle carrier (11) with the nozzle (9) in opposite directions and comprising a hollow nut (13) having inner threads (14) engaging outer threads (15) at the outer periphery of the sleeve (11), whereby said hollow nut (13) acts like a micrometer screw.
6. A mounting tool according to any of the preceding claims, **characterised** in that the tool is formed with a distribution box (16) adapted to direct pressure fluid to the fixed nozzle (8) or to the axially displaceable nozzle (9), or vice versa.
7. A mounting tool according to claim 6, **characterised** in that the distribution box (16) is formed with means for allowing escape of pressure fluid from one of the pressure chambers (17, 18, 28, 29) of the chuck while pressurising the other pressure chamber of said chuck.
8. A mounting tool according to any of the preceding claims, **characterised** in that the pressure pistons (nozzles 8, 9) are hydraulically preloaded in that they are more strongly sealed against the chuck inlet/outlet as the inlet pressure is increased.
9. A mounting tool according to any of the preceding claims, **characterised** in that the nozzles (8, 9) are spring loaded and in that the bores (19, 20) thereof are formed with stop means arranged to close said bores when the nozzles are out of contact with the chuck.

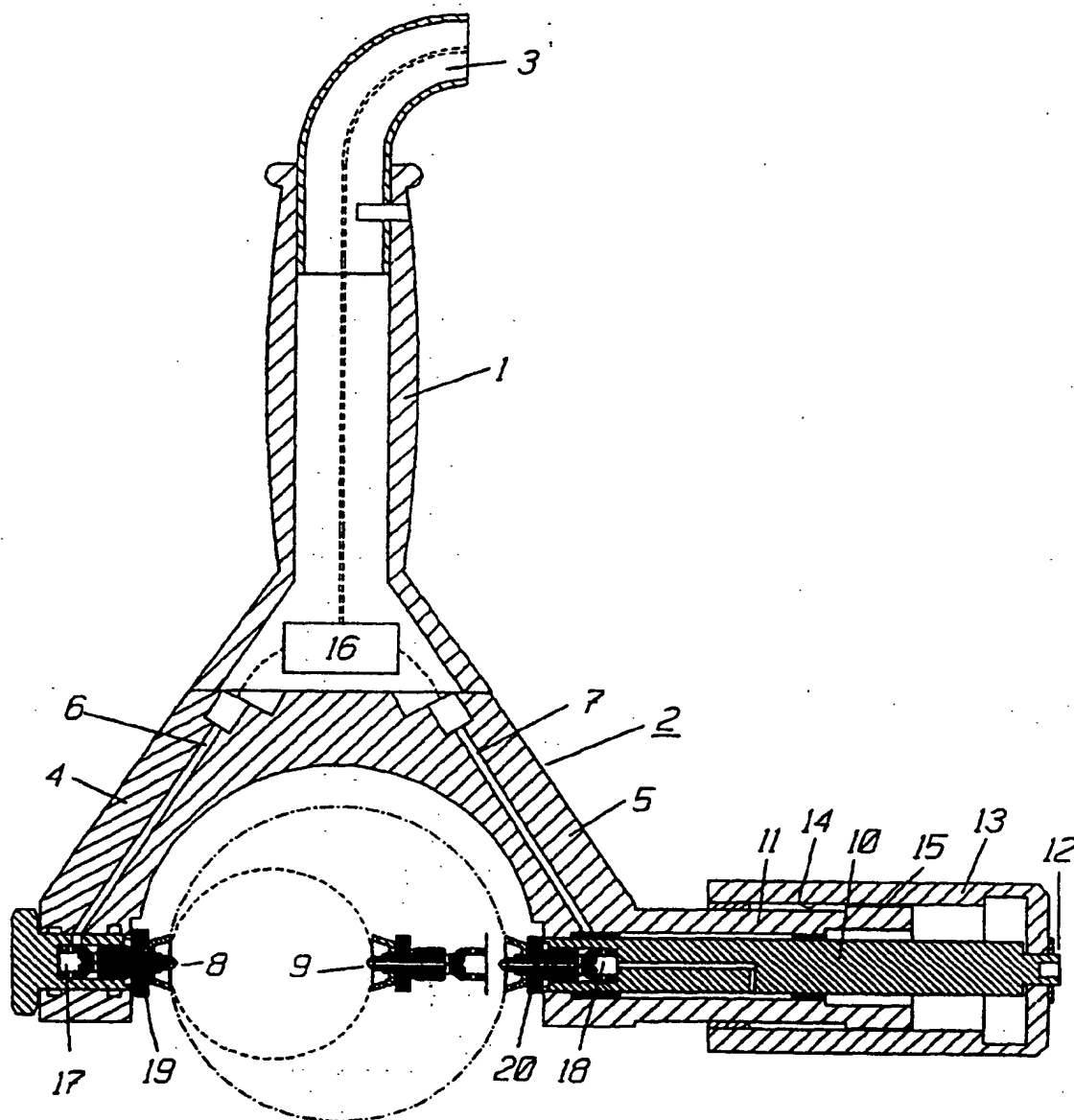


Fig. 1

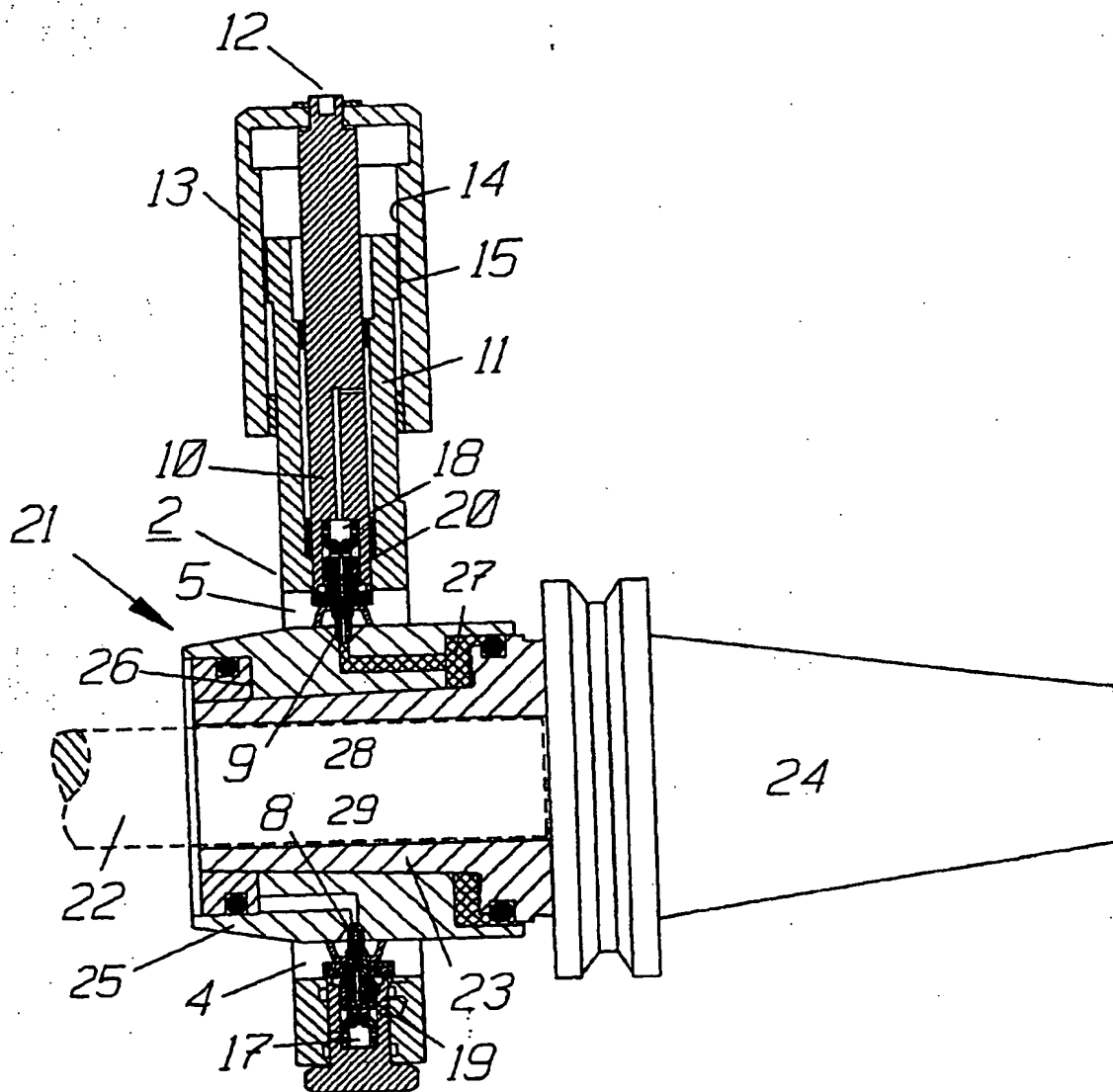


Fig. 2

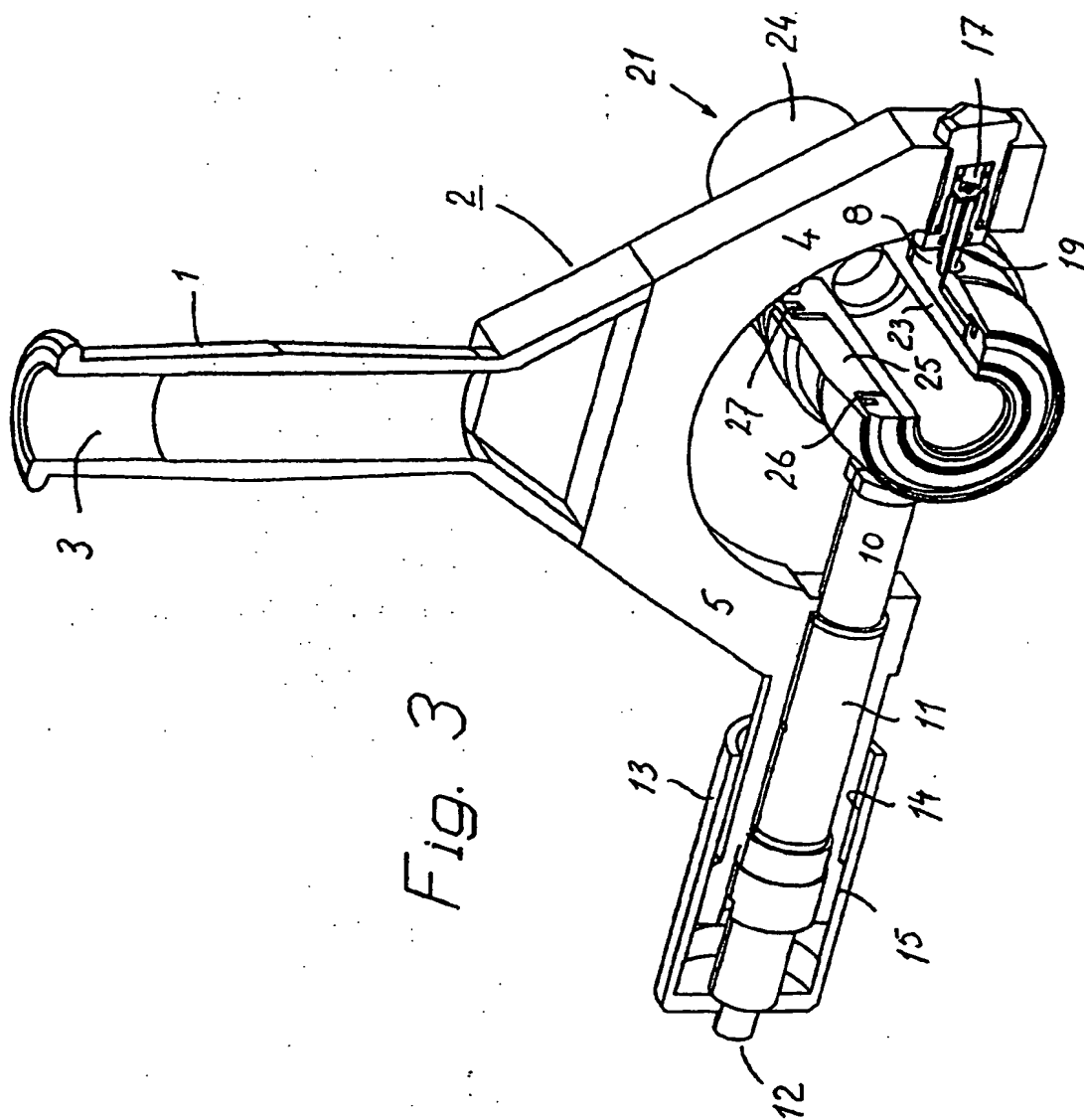


Fig. 3



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 00 85 0180

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 4 745 674 A (ABE HITOSHI ET AL) 24 May 1988 (1988-05-24) * claim 1; figures 5-7 *	1	82301/00 823831/30
A	US 4 682 913 A (SHATTO HOWARD L ET AL) 28 July 1987 (1987-07-28) * claim 1 *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			8230 8238
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 February 2001	Examiner De Gussem, J
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 85 0180

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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13-02-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 4682913 A	28-07-1987	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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PN - SU1364405 A 19880107
TI - ARRANGEMENT FOR MECHANICAL SECURING OF TOOL
PA - PAVLODARSK IND I (SU)
IN - EMEL'YANOV ALEKSANDR G (SU); RUL ALEKSANDR A (SU); RUL IVAN A (SU); KOKAREV VLADIMIR I (SU); NAUMOV NIKOLAJ O (SU)
AP - SU19854008484 19851218
PR - SU19854008484 19851218
DT - I

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AN - 1988-211472 [30]
TI - Tool mechanised clamping unit - has additional hydraulic cylinder in spindle with hollow piston formed by spindle flange
AB - SU1364405 Quill (2) traverse unit is a hydraulic cylinder with the quill acting as the cylinder body and the piston being an annular flange (5) on the spindle. The clamp unit incorporates an additional hydraulic cylinder with its hollow piston (7) having a conical groove on the end and locating in the spindle axial bore, also has a sealing ring (8) in the conical groove acting on the clamping element faces and tool shank outer surface. The quill is spring loaded in the direction of spindle movement during clamping and the cylinder working chambers (9,11) are connected by channels (10,12) in the cylinder interconnecting and linked to the coolant feed system.
- USE/ADVANTAGE - The tool clamp is used for deep hole drilling and offers reduced energy costs on machines with internally cooled tools. Bul. 1/7.1.88(1/1)
IW - TOOL MECHANISE CLAMP UNIT ADD HYDRAULIC CYLINDER SPINDLE HOLLOW PISTON FORMING SPINDLE FLANGE
PN - SU1364405 A 19880107 DW198830 002pp
IC - B23B5/26 ;B23B31/04
DC - P54
PA - (PAVL-R) PAVLODARSK IND INST
IN - EMEL'YANOV A G; KOKAREV V I; NAUMOV N O
AP - SU19854008484 19851218
PR - SU19854008484 19851218



СОЮЗ СОВЕТСКИХ
СОЦИАЛИСТИЧЕСКИХ
РЕСПУБЛИК

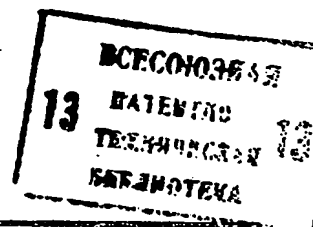
(19) **SU** (11) **1364405**

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(51)4 В 23 В 31/04, 5/26

ГОСУДАРСТВЕННЫЙ КОМИТЕТ СССР
ПО ДЕЛАМ ИЗОБРЕТЕНИЙ И ОТКРЫТИЙ

ОПИСАНИЕ ИЗОБРЕТЕНИЯ К АВТОРСКОМУ СВИДЕТЕЛЬСТВУ



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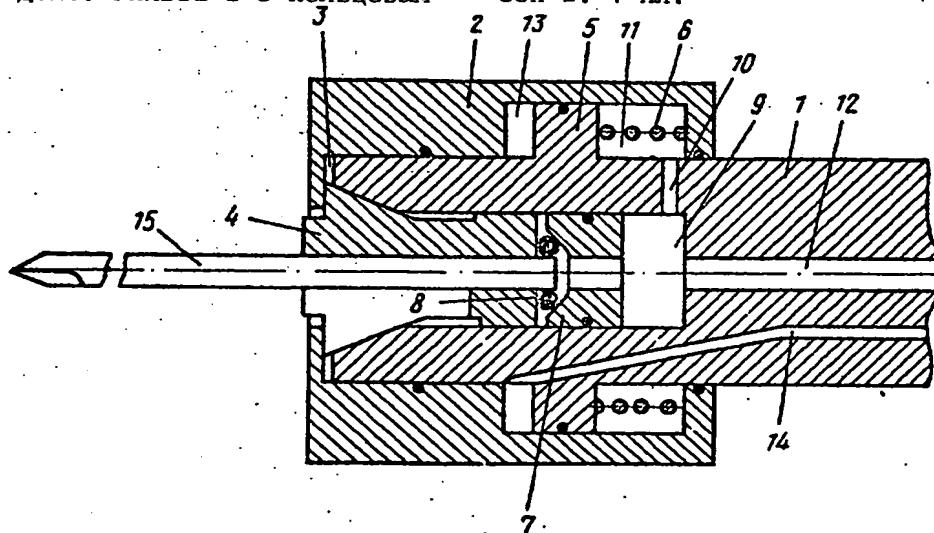
(53) 621.952-229.2(088.8)

(56) Авторское свидетельство СССР
№ 332932, кл. В 23 В 31/04, 1970.

(54) УСТРОЙСТВО ДЛЯ МЕХАНИЗИРОВАННОГО
КРЕПЛЕНИЯ ИНСТРУМЕНТА

(57) Изобретение относится к области станкостроения и может быть использовано для зажима сверл на станках для глубокого сверления. Целью изобретения является снижение энергозатрат при работе на станках с охлаждением. Устройство содержит шпиндель 1 и установленную на нем гильзу 2, взаимодействующую с цангой 4, установленной в шпинделе. Гильза 2 с кольцевым

выступом 5 на шпинделе 1 образуют гидроцилиндр. В отверстии шпинделя 1 установлен полый поршень 7 с конической выточкой на торце, в которой установлено уплотнительное кольцо 8. Полость между поршнем 7 и торцом отверстия в шпинделе 1 соединена с полостью 11 гидроцилиндра, образованного гильзой 2 и выступом 5, и каналом с системой для подвода охлаждающей жидкости. Зажим инструмента 15, установленного в отверстии цанги 4, осуществляется при подаче охлаждающей жидкости в полость 11. При этом поршень 7 прижимает кольцо 8 к торцу цанги и к поверхности хвостовика инструмента, уплотняя зазоры. Отжим инструмента производится при подаче рабочей жидкости из гидростанции станка в полость 13. Предварительный зажим сверла осуществляется пружиной 6, установленной между поршнем 7 и гильзой 2. 1 ил.



(19) **SU** (11) **1364405** **A1**

Изобретение относится к станко-строению и может быть использовано для зажима сверл на станках для глубокого сверления.

Целью изобретения является расширение технологических возможностей устройства за счет применения сверл с внутренним подводом охлаждающей жидкости.

На чертеже показано устройство, общий вид, продольный разрез.

Устройство содержит шпиндель 1 и установленную на шпинделе с возможностью осевого перемещения гильзу 2, контактирующую внутренней торцевой поверхностью 3 и с торцовыми поверхностями зажимных элементов цанги 4. Гильза 2 является корпусом гидроцилиндра, поршнем которого является выполненный на шпинделе кольцевой выступ 5. Гильза 2 подпружинена относительно выступа 5 пружиной 6. В осевом отверстии шпинделя установлен полый поршень 7 с конической выточкой на торце, в которой установлено уплотнительное кольцо 8.

Образованная между поршнем 7 и дном отверстия полость 9 соединена каналом 10 с полостью 11 гидроцилиндра, образованного гильзой 2 и выступом 5. Полость 9 соединена каналом 12 с системой для подвода охлаждающей жидкости. Другая полость 13 между гильзой 2 и выступом 5 соединена каналом 14 с источником гидравлического давления.

Устройство работает следующим образом.

При подаче в полость 13 через канал 14 рабочей жидкости гильза 2 перемещается влево, освобождая цангу 4. После установки инструмента 15 в отверстие цанги подача рабочей жидкости в полость 13 прекращается, и гильза 2 под действием пружины 6, перемещается вправо, обеспечивая предварительный зажим инструмента в цанге. В процессе обработки через канал 12 охлаждающая жидкость поступает в полости 9 и 11, в результате чего происходит окончательный зажим цанги 4 гильзой 2, а также деформация

уплотнительного кольца 8 вследствие перемещения поршня 7 влево. Контакт с торцом цанги 4 и наружной поверхностью хвостовика инструмента 15, кольцо 8 исключает утечки жидкости через зазоры в сопряжениях цанги со шпинделем и инструментом.

Использование в данном устройстве энергии потока охлаждающей жидкости для зажима инструмента позволяет также снизить энергозатраты за счет исключения дополнительного потребления энергии от гидростанции станка во время обработки.

Ф о р м у л а и з о б р е т е н и я

Устройство для механизированного крепления инструмента, содержащее шпиндель, установленную на шпинделе с возможностью осевого перемещения гильзу с внутренней поверхностью, предназначенной для взаимодействия с ответными поверхностями зажимных элементов, установленных с возможностью радиального перемещения относительно оси шпинделя, и привод перемещения гильзы, отличающееся тем, что, с целью снижения энергозатрат при работе на станках с охлаждением, привод перемещения гильзы выполнен в виде гидроцилиндра, корпусом которого является гильза, а поршнем - выполненный на шпинделе кольцевой выступ, при этом устройство снабжено дополнительным гидроцилиндром, полый поршень которого с конической выточкой на торце установлен в выполненном в шпинделе осевом отверстии, и уплотнительным кольцом, установленным в упомянутой конической выточке с возможностью взаимодействия с торцевой поверхностью зажимных элементов и наружной поверхностью хвостовика инструмента, причем гильза подпружинена относительно шпинделя в направлении ее перемещения при зажиме, а рабочие полости упомянутых гидроцилиндров соединены посредством выполненных в шпинделе каналов между собой и с системой для подачи охлаждающей жидкости.